

---

Draft

**ADVISORY BOARD ON  
RADIATION AND WORKER HEALTH**

*National Institute for Occupational Safety and Health*

**PRE-REVIEWS OF REVISED DOCUMENTS  
ORAUT-OTIB-0005, ORAUT-PROC-0031,  
ORAUT-PROC-0061, AND ORAUT-OTIB-0020**

**Contract No. 200-2009-28555**

Prepared by

Joyce Lipsztein  
Stephen Ostrow  
Harry Pettengill  
Stephen Marschke  
S. Cohen & Associates  
1608 Spring Hill Road, Suite 400  
Vienna, VA 22182

January 2013

---

*Disclaimer*

*This document is made available in accordance with the unanimous desire of the Advisory Board on Radiation and Worker Health (ABRWH) to maintain all possible openness in its deliberations. However, the ABRWH and its contractor, SC&A, caution the reader that at the time of its release, this report is pre-decisional and has not been reviewed by the Board for factual accuracy or applicability within the requirements of 42 CFR 82. This implies that once reviewed by the ABRWH, the Board's position may differ from the report's conclusions. Thus, the reader should be cautioned that this report is for information only and that premature interpretations regarding its conclusions are unwarranted.*

|                                     |                           |   |                     |
|-------------------------------------|---------------------------|---|---------------------|
| Effective Date:<br>January 25, 2013 | Revision No.<br>Draft – 0 | Document No.<br>Pre-Review of Revised Documents | Page No.<br>2 of 10 |
|-------------------------------------|---------------------------|---|---------------------|

|   |   |
|---|---|
| <p>S. COHEN &amp; ASSOCIATES:</p> <p><i>Technical Support for the Advisory Board on Radiation &amp; Worker Health Review of NIOSH Dose Reconstruction Program</i></p> | <p>Document No.<br/>Pre-Review of Revised Documents</p> |
|   | <p>Effective Date:<br/>Draft – January 25, 2013</p>     |
| <p><b>PRE-REVIEWS OF REVISED DOCUMENTS<br/>ORAUT-OTIB-0005, ORAUT-PROC-0031,<br/>ORAUT-PROC-0061, AND ORAUT-OTIB-0020</b></p>   | <p>Page 2 of 10</p>                                     |
| <p>Task Manager:</p> <p>_____ Date: _____</p> <p>Stephen F. Marschke</p>  | <p>Supersedes:</p> <p>N/A</p>                           |
| <p>Project Manager:</p> <p>_____ Date: _____</p> <p>John Stiver, MS, CHP</p>  | <p>Reviewers:</p> <p>John Stiver</p>                    |

**Record of Revisions**

| <b>Revision Number</b> | <b>Effective Date</b> | <b>Description of Revision</b> |
|------------------------|-----------------------|--------------------------------|
| 0 (Draft)              | 01/25/2013            | Initial issue.                 |
|                        |                       |                                |
|                        |                       |                                |
|                        |                       |                                |
|                        |                       |                                |
|                        |                       |                                |
|                        |                       |                                |

**NOTICE:** This report has been reviewed for Privacy Act information and has been cleared for distribution. However, this report is pre-decisional and has not been reviewed by the Advisory Board on Radiation and Worker Health for factual accuracy or applicability within the requirements of 42 CFR 82.

|                                     |                           |   |                     |
|-------------------------------------|---------------------------|---|---------------------|
| Effective Date:<br>January 25, 2013 | Revision No.<br>Draft – 0 | Document No.<br>Pre-Review of Revised Documents | Page No.<br>3 of 10 |
|-------------------------------------|---------------------------|---|---------------------|

## TABLE OF CONTENTS

|   |    |
|---|----|
| Acronyms and Abbreviations .....  | 4  |
| 1.0 Introduction.....   | 5  |
| 2.0 Documents Previously Reviewed by SC&A .....   | 6  |
| 2.1 ORAUT-OTIB-0005 – Internal Dosimetry Organ, External Dosimetry<br>Organ, and IREP Model Selection by ICD-9 Code ..... | 6  |
| 2.1.1 Purpose of the Technical Information Bulletin.....  | 6  |
| 2.1.2 Pre-Review Conclusions.....   | 6  |
| 2.2 ORAUT-PROC-0031 – Site Profile and Technical Basis Document<br>Development.....                                       | 6  |
| 2.2.1 Purpose of the Procedure .....  | 7  |
| 2.2.2 Pre-Review Conclusions.....   | 7  |
| 2.3 ORAUT-PROC-0061 – Occupational Medical X-Ray Dose Reconstruction<br>for DOE Sites.....                                | 7  |
| 2.3.1 Purpose of the Procedure .....  | 7  |
| 2.3.2 Pre-Review Conclusions.....   | 8  |
| 2.4 ORAUT-OTIB-0020 – Use of Coworker Dosimetry Data for External Dose<br>Assignment .....                                | 8  |
| 2.4.1 Purpose of the Procedure .....  | 8  |
| 2.4.2 Pre-Review Conclusions.....   | 9  |
| 3.0 Documents Previously Reviewed by SC&A .....   | 10 |

**NOTICE:** This report has been reviewed for Privacy Act information and has been cleared for distribution. However, this report is pre-decisional and has not been reviewed by the Advisory Board on Radiation and Worker Health for factual accuracy or applicability within the requirements of 42 CFR 82.

|                                     |                           |   |                     |
|-------------------------------------|---------------------------|---|---------------------|
| Effective Date:<br>January 25, 2013 | Revision No.<br>Draft – 0 | Document No.<br>Pre-Review of Revised Documents | Page No.<br>4 of 10 |
|-------------------------------------|---------------------------|---|---------------------|

## ACRONYMS AND ABBREVIATIONS

|                            |   |
|----------------------------|---|
| Advisory Board<br>or Board | Advisory Board on Radiation and Worker Health                         |
| DCAS                       | Division of Compensation Analysis and Support                         |
| DOE                        | (U.S.) Department of Energy   |
| EEOICPA                    | Energy Employee Occupational Illness Compensation Program Act of 2000 |
| ET                         | extrathoracic region  |
| ICD                        | International Classification of Diseases                              |
| ICRP                       | International Commission on Radiological Protection                   |
| IREP                       | Interactive RadioEpidemiological Program                              |
| NIOSH                      | National Institute for Occupational Safety and Health                 |
| ORAU                       | Oak Ridge Associated Universities                                     |
| ORAUT                      | Oak Ridge Associated Universities Team                                |
| PROC                       | Procedure   |
| SC&A                       | S. Cohen and Associates (SC&A, Inc.)                                  |
| SP                         | Site Profile  |
| TBD                        | Technical Basis Document  |
| TIB                        | Technical Information Bulletin  |
| WHO                        | World Health Organization   |

**NOTICE:** This report has been reviewed for Privacy Act information and has been cleared for distribution. However, this report is pre-decisional and has not been reviewed by the Advisory Board on Radiation and Worker Health for factual accuracy or applicability within the requirements of 42 CFR 82.

|                                     |                           |   |                     |
|-------------------------------------|---------------------------|---|---------------------|
| Effective Date:<br>January 25, 2013 | Revision No.<br>Draft – 0 | Document No.<br>Pre-Review of Revised Documents | Page No.<br>5 of 10 |
|-------------------------------------|---------------------------|---|---------------------|

## 1.0 INTRODUCTION

As the technical contractor to the National Institute for Occupational Safety and Health (NIOSH), Division of Compensation Analysis and Support (DCAS), the Oak Ridge Associated Universities Team (ORAUT) performs dose reconstructions under the Energy Employee Occupational Illness Compensation Program Act of 2000 (EEOICPA). As technical support contractor to the Advisory Board on Radiation and Worker Health (Advisory Board), S. Cohen & Associates (SC&A) performs (at the Advisory Board's direction) technical reviews of the work performed by both DCAS and ORAUT. As part of that responsibility, the Advisory Board recently had SC&A review the ORAUT list of approved procedures and other documents to determine if any were candidates for review. SC&A identified five previously reviewed documents that had been revised by ORAUT two or more times since the SC&A review, and thus, could be considered as candidates for re-review. The five identified ORAUT documents are:

- (1) ORAUT-OTIB-0005, *Internal Dosimetry Organ, External Dosimetry Organ, and IREP Model Selection by ICD-9 Code* (ORAUT 2011a)
- (2) ORAUT-PROC-0031, *Site Profile and Technical Basis Document Development* (ORAUT 2011b)
- (3) ORAUT-PROC-0061, *Occupational Medical X-Ray Dose Reconstruction for DOE Sites* (ORAUT 2010)
- (4) ORAUT-OTIB-0020, *Use of Coworker Dosimetry Data for External Dose Assignment* (ORAUT 2011c)
- (5) ORAUT-PROC-0066, *Quality Assurance Records Management* (ORAUT 2009)

During its June 20, 2012, meeting, the Board discussed what to do with these five documents. Since ORAUT-PROC-0066 was not a "technical" document, the Advisory Board felt that it did not merit an additional review. The Board tentatively tasked SC&A to re-review the other four documents, but indicated that a final decision on approval would be provided by the Procedures Subcommittee, after the Subcommittee discussed the merits of re-reviewing each document.

At its July 31, 2012, meeting, the Procedures Subcommittee expressed concern that the changes to each of the four documents being considered for re-review may not warrant the expenditure of effort that is required to prepare for, perform, and document a full review. With this in mind, it was decided that SC&A should perform a pre-review to determine the nature and extent of the changes that were made to each document in question since originally reviewed. This report presents the results of those four pre-reviews.

**NOTICE:** This report has been reviewed for Privacy Act information and has been cleared for distribution. However, this report is pre-decisional and has not been reviewed by the Advisory Board on Radiation and Worker Health for factual accuracy or applicability within the requirements of 42 CFR 82.

|                                     |                           |   |                     |
|-------------------------------------|---------------------------|---|---------------------|
| Effective Date:<br>January 25, 2013 | Revision No.<br>Draft – 0 | Document No.<br>Pre-Review of Revised Documents | Page No.<br>6 of 10 |
|-------------------------------------|---------------------------|---|---------------------|

## 2.0 DOCUMENTS PREVIOUSLY REVIEWED BY SC&A

### 2.1 ORAUT-OTIB-0005 – INTERNAL DOSIMETRY ORGAN, EXTERNAL DOSIMETRY ORGAN, AND IREP MODEL SELECTION BY ICD-9 CODE

This pre-review of ORAUT-OTIB-0005, *Internal Dosimetry Organ, External Dosimetry Organ, and IREP Model Selection by ICD-9 Code*, Revision 4, dated April 18, 2011, was prepared by Joyce Lipsztein, PhD. In January 2005, Dr Lipsztein performed SC&A's original review of OTIB-0005, Revision 1, dated January 23, 2004. Three findings were identified in the original review; all three findings have been addressed by the Subcommittee and closed.

#### 2.1.1 Purpose of the Technical Information Bulletin

The stated purpose of OTIB-0005 is to provide guidance:

*... on selection of (1) the appropriate International Commission on Radiological Protection (ICRP) organ or tissue model to estimate the internal dose for specific codes from the World Health Organization's (WHO) International Classification of Diseases, Ninth Revision (ICD-9; WHO 1977), (2) the appropriate organs or tissues to estimate external dose, and (3) the appropriate model in the Interactive RadioEpidemiological Program (IREP). This TIB also provides information for selecting and assessing likely primary cancers for secondary cancers.*

#### 2.1.2 Pre-Review Conclusions

It was determined that a full re-review of ORAUT-OTIB-0005 is not needed. The previous issue with OTIB-0005 was that it did not reflect the fact that International Commission on Radiological Protection (ICRP) Publication 66 recommended that the oral cavity should be part of the extrathoracic region 2 (ET<sub>2</sub>). The new ICRP Publication 103 (ICRP 2007) does not recommend the inclusion of the oral cavity as part of ET<sub>2</sub>. Instead, the oral mucosa is now part of the remainder. Thus, a re-review is not needed and OTIB-0005, Revision 4, may be accepted without further comments.

### 2.2 ORAUT-PROC-0031 – SITE PROFILE AND TECHNICAL BASIS DOCUMENT DEVELOPMENT

This pre-review of ORAUT-PROC-0031, *Site Profile and Technical Basis Document Development*, Revision 3, dated November 14, 2011, was prepared by Stephen Ostrow, PhD. In August 2007, Dr. Ostrow performed SC&A's original review of PROC-0031, Revision 1, dated December 15, 2005. Two findings were identified in the original review; both findings have been addressed by the Subcommittee and closed.

**NOTICE:** This report has been reviewed for Privacy Act information and has been cleared for distribution. However, this report is pre-decisional and has not been reviewed by the Advisory Board on Radiation and Worker Health for factual accuracy or applicability within the requirements of 42 CFR 82.

|                                     |                           |   |                     |
|-------------------------------------|---------------------------|---|---------------------|
| Effective Date:<br>January 25, 2013 | Revision No.<br>Draft – 0 | Document No.<br>Pre-Review of Revised Documents | Page No.<br>7 of 10 |
|-------------------------------------|---------------------------|---|---------------------|

### 2.2.1 Purpose of the Procedure

The stated purpose of ORAUT-PROC-0031 is to provide guidance:

*...for establishing SP/TBD [Site Profile/Technical Basis Document] Teams to develop and revise SPs/TBDs, and it defines the structure and content of SPs/TBDs.*

### 2.2.2 Pre-Review Conclusions

SC&A's pre-review of PROC-0031, Revision 3 (November 14, 2011), found that there are no material technical changes to the document from Revision 1, which was originally reviewed. Additionally, PROC-0031 is a procedural, rather than technical, document. Hence, a full re-review is not required and PROC-0031, Revision 3, may be accepted without further comments.

SC&A's general impression is that PROC-0031, Revision 3, is a substantial improvement over the earlier version, in that it is clearer and more detailed as to the steps and considerations involved in producing an SP/TBD. However, SC&A did not check the accuracy of the many references to other documents made in PROC-0031.

## 2.3 ORAUT-PROC-0061 – OCCUPATIONAL MEDICAL X-RAY DOSE RECONSTRUCTION FOR DOE SITES

The pre-review of ORAUT-PROC-0061, *Occupational Medical X-Ray Dose Reconstruction for DOE Sites*, Revision 3, dated March 3, 2010, was prepared by Harry Pettengill, PhD. In August 2007, Dr. Pettengill performed SC&A's original review of PROC-0061, Revision 0, dated December 1, 2004. Four findings were identified in the original review; three of the findings have been addressed by the Subcommittee and closed. The fourth finding (PROC-0061-04), whose resolution remains in progress, is:

*The dose reconstructor is not advised to make corrections for retakes or additional exposures due to poor technique or processing—the estimated “maximizing” dose may not be claimant favorable.*

### 2.3.1 Purpose of the Procedure

The stated purpose of ORAUT-PROC-0061 is to provide direction:

*...on reconstruction of doses from occupational medical X-rays for the Oak Ridge Associated Universities (ORAU) Team Dose Reconstruction Project for the National Institute for Occupational Safety and Health (NIOSH). The Energy Employees Occupational Illness Compensation Program Act of 2000 (EEOICPA) requires the assignment of external dose from medical X-ray examinations that were performed for occupational health screening and required as a condition of employment. This procedure relies on information in site technical basis documents (TBDs), and it supersedes some of the instructions for X-ray dose reconstruction in ORAUT-PROC-0006 Rev. 01, External Dose Reconstruction.*

**NOTICE:** This report has been reviewed for Privacy Act information and has been cleared for distribution. However, this report is pre-decisional and has not been reviewed by the Advisory Board on Radiation and Worker Health for factual accuracy or applicability within the requirements of 42 CFR 82.

|                                     |                           |   |                     |
|-------------------------------------|---------------------------|---|---------------------|
| Effective Date:<br>January 25, 2013 | Revision No.<br>Draft – 0 | Document No.<br>Pre-Review of Revised Documents | Page No.<br>8 of 10 |
|-------------------------------------|---------------------------|---|---------------------|

### 2.3.2 Pre-Review Conclusions

The conclusions from SC&A’s pre-review of ORAUT-PROC-0061, Revision 3, are as follows:

- (1) As stated above, SC&A originally had four concerns regarding PROC-0061, Revision 0; the first three were adequately addressed, have since been closed, and have been incorporated in PROC-0061, Revision 2.
- (2) The one “In Progress” finding is not addressed directly in Revision 3, but is handled in the other documents that the dose reconstructors are directed to consider. Finding PROC-0061-04 dealt with the impact on dose due to x-ray retakes. SC&A’s concern was that PROC-0061 stated that the impact of retakes was less than 3% and referenced the Trout black lung study (Trout et al. 1973). SC&A believed that 3% was too low. In Revision 3, ORAUT has moved the reference table for x-ray dose assignments to the “O” drive, thereby ensuring that the latest versions from the TBD, updated TIBs, etc., are used by dose reconstructors. It also transfers the 3% retake issue from PROC-0061 into the realm of SP/TBD reviews. SC&A believes that these steps adequately address our remaining concern with PROC-0061, and recommends that the status of Finding PROC-0061-04 be changed to “Closed.”
- (3) The Revision 3 changes to PROC-0061 are essentially editorial or administrative. For example, the document originally listed three approaches to dose reconstruction (Maximizing, Best Estimate, and Minimizing); in Revision 3 the “Maximizing” category was changed to “Overestimate.”
- (4) Additionally, the PROC-0061 Revision 3 list of references has been generalized, with no specific citations given. Since Revision 3 directs the use of the “O” drive, this will ensure that the dose reconstructors use the latest version.

Hence, a full re-review is not required and PROC-0061, Revision 3, may be accepted without further comments.

## 2.4 ORAUT-OTIB-0020 – USE OF COWORKER DOSIMETRY DATA FOR EXTERNAL DOSE ASSIGNMENT

The pre-review of ORAUT-OTIB-0020, *Use of Coworker Dosimetry Data for External Dose Assignment*, Revision 3, dated November 14, 2011, was prepared by Stephen Marschke. In August 2007, Hans Behling, PhD, MPH, performed SC&A’s original review of OTIB-0020, Revision 1, dated October 7, 2005. Five findings were identified in the original review; all five findings have been addressed by the Subcommittee and closed.

### 2.4.1 Purpose of the Procedure

The stated purpose of ORAUT-OTIB-0020 is to provide:

*...general information to allow Oak Ridge Associated Universities (ORAU) Team dose reconstructors to assign doses based on site coworker external dosimetry data to workers at DOE sites who have little or no individual monitoring data.*

**NOTICE:** This report has been reviewed for Privacy Act information and has been cleared for distribution. However, this report is pre-decisional and has not been reviewed by the Advisory Board on Radiation and Worker Health for factual accuracy or applicability within the requirements of 42 CFR 82.

|                                     |                           |   |                     |
|-------------------------------------|---------------------------|---|---------------------|
| Effective Date:<br>January 25, 2013 | Revision No.<br>Draft – 0 | Document No.<br>Pre-Review of Revised Documents | Page No.<br>9 of 10 |
|-------------------------------------|---------------------------|---|---------------------|

*This TIB is to be used in conjunction with separate TIBs or other approved documents that provide site-specific coworker data.*

#### **2.4.2 Pre-Review Conclusions**

Since SC&A's original review of OTIB-0020, there have been two changes to the document: (1) the K-25 example coworker doses, which had been provided in Table 7-1, have been removed in response to a Quality of Science (10-year review) comment, and (2) the second paragraph of Section 3 was modified as agreed upon by the Subcommittee, NIOSH, and SC&A in order to address a finding made by SC&A on ORAUT-OTIB-0052, Revision 00 (ORAUT 2006) (i.e., Finding OTIB-0052-16).

Neither of these changes to OTIB-0020 is of a technical nature; thus, a full re-review is not required and OTIB-0020, Revision 3, may be accepted without further comments.

**NOTICE:** This report has been reviewed for Privacy Act information and has been cleared for distribution. However, this report is pre-decisional and has not been reviewed by the Advisory Board on Radiation and Worker Health for factual accuracy or applicability within the requirements of 42 CFR 82.

|                                     |                           |   |                      |
|-------------------------------------|---------------------------|---|----------------------|
| Effective Date:<br>January 25, 2013 | Revision No.<br>Draft – 0 | Document No.<br>Pre-Review of Revised Documents | Page No.<br>10 of 10 |
|-------------------------------------|---------------------------|---|----------------------|

### 3.0 DOCUMENTS PREVIOUSLY REVIEWED BY SC&A

ICRP 1994. *Human Respiratory Tract Model for Radiological Protection*, International Commission on Radiological Protection, Publication 66, Ann. ICRP 24 (1-3).

ICRP 2007. *The 2007 Recommendations of the International Commission on Radiological Protection*, International Commission on Radiological Protection, Publication 103, Ann. ICRP 37 (2-4).

ORAUT 2006a. *Occupational Onsite Ambient Dose Reconstruction for DOE Sites*, ORAUT-PROC-0060, Rev. 01. Oak Ridge Associated Universities Team, Cincinnati, Ohio. June 28, 2006.

ORAUT 2006. *Parameters to Consider When Processing Claims for Construction Trade Workers*, ORAUT-OTIB-0052, Rev. 00. Oak Ridge Associated Universities Team, Cincinnati, Ohio. August 31, 2006.

ORAUT 2008. *Occupational X-ray Dose Reconstruction for DOE Sites*, ORAUT-PROC-0061, Rev. 01, Oak Ridge Associated Universities Team, Cincinnati, Ohio. January 2, 2008.

ORAUT 2009. *Quality Assurance Records Management*, ORAUT-PROC-0066, Rev. 02. Oak Ridge Associated Universities Team, Cincinnati, Ohio. September 15, 2009.

ORAUT 2010. *Occupational Medical X-Ray Dose Reconstruction for DOE Sites*, ORAUT-PROC-0061, Rev. 03. Oak Ridge Associated Universities Team, Cincinnati, Ohio. March 3, 2010.

ORAUT 2011a. *Internal Dosimetry Organ, External Dosimetry Organ, and IREP Model Selection by ICD-9 Code*, ORAUT-OTIB-0005, Rev. 04. Oak Ridge Associated Universities Team, Cincinnati, Ohio. April 18, 2011.

ORAUT 2011b. *Site Profile and Technical Basis Document Development*, ORAUT-PROC-0031, Rev. 03. Oak Ridge Associated Universities Team, Cincinnati, Ohio. November 14, 2011.

ORAUT 2011c. *Use of Coworker Dosimetry Data for External Dose Assignment*, ORAUT-OTIB-0020, Rev. 03. Oak Ridge Associated Universities Team, Cincinnati, Ohio. November 14, 2011.

Trout, E.D., G. Jacobson, R.T. Moore, and E.P. Shoub, 1973. "Analysis of the Rejection Rate of Chest Radiographs Obtained During the Coal Mine 'Black Lung' Program." *Radiology* 109:25-27.

WHO 1977. *International Classification of Diseases, Ninth Revision*, World Health Organization, World Health Assembly, Geneva, Switzerland.

**NOTICE:** This report has been reviewed for Privacy Act information and has been cleared for distribution. However, this report is pre-decisional and has not been reviewed by the Advisory Board on Radiation and Worker Health for factual accuracy or applicability within the requirements of 42 CFR 82.